

## ABSTRACT

An optically sampling device optically samples an optical analog signal using a sampled signal having a predetermined sampling frequency, and outputs control light having a pulse train of an optically sampled optical analog signal. A signal generating device generates a pulse train of signal light which is synchronized with the sampled signal. An optical encoding device optically encodes the pulse train of the signal light according to the control light, by using optical encoders each including nonlinear optical loop mirrors, and outputs pulse trains of optically encoded signal light from said optical encoders, respectively. An optically quantizing device performs optical threshold processing on the pulse trains of optically-encoded signal light to optically quantize them, by using at least one of optical threshold processors each of which is connected to each of said optical encoders and includes a nonlinear optical device, and outputs optically quantized pulse trains as optical digital signals.